Title: EFFECT OF SALINITY AND TEMPERATURE ON THE SEDIMENT/WATER EXCHANGE OF P: PREDICTING RESPONSE OF P CYCLING TO INCREASING FRESHWATER FLOW INTO FLORIDA BAY.

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Project Summary: Because phosphorus (P) is a limiting nutrient to seagrasses throughout the entire Florida Bay and to phytoplankton at least in eastern Bay, the supply of P is critical to the health of seagrass community and the frequency, intensity and duration of phytoplankton blooms. Carbonate sediments strongly retain P and sediments have been quantified as a dominant P reservoir in Florida Bay. Sediments are readily suspended into water column by wind and tidal mixing in shallow (average water depth 1 m) Florida Bay. The sediment/water exchange of P through adsorption/desorption represents the most important P cycling processes and plays a critical role in supplying bioavailable P to the water column. Previous studies have shown a strong gradient of decreasing sediment exchangeable P concentration from the west to the east across the Bay. The spatial pattern of sediment exchangeable P is similar to that of dissolved phosphate concentrations in the water. As carbonate sediments function as a P buffer system, it is hypothesized that sedimentary P regulates the dissolved phosphate concentrations in the shallow water column. PI's previous study at a single ambient condition (25°C and salinity 36 seawater) demonstrated that sediment/water exchange of P vary considerably between locations within the Bay but shown a consistent spatial pattern with that of sediment exchangeable P content. Preliminary study at a couple of stations also indicated that sediment/water exchange of P is a strong function of ambient temperature and salinity. To completely characterize the sediment-water exchange of P in Florida Bay, a systematic study is proposed to quantify the effect of salinity and temperature on sediment/water partitioning of P. For a given station location, individual sediment characteristics for P exchange, such as the zero equilibrium phosphate concentration, the distribution coefficient, and P buffering capacity of sediment will be quantified over a range of water salinity (0-70) at different ambient temperature (a range of 10-40°C). Such a suite of experiments will be repeated at 10 selected

	sampling locations covering both different sediment characteristics and geographic region of the Bay. To achieve this goal, a total of about 240 adsorption/desorption experiments will be conducted with Florida Bay sediments. This systematic study will provide a spatial distribution of sediment parameters relevant to P cycling as a function of salinity and temperature in Florida Bay. These parameters are essential in water quality models for predicting the effect of increasing freshwater input, as proposed by the Comprehensive Everglades Restoration Plan, on the P cycle in Florida Bay.
Relevance to Restoration and/or Resource Management:	Proposed changes in flow as a result of the Comprehensive Everglades Restoration Plan necessitate a better understanding of how changing the salinity in the northwest region of Florida Bay would affect the sediment behavior with respect to P exchange in an area where sediments are relatively rich in phosphorus i.e., data derived from this project will help support Florida Bay water quality and seagrass ecosystem models required by the Florida Bay/Florida Keys Feasibility Study.
Geographic Area:	Florida Bay.